S3C6410-TFA User manual

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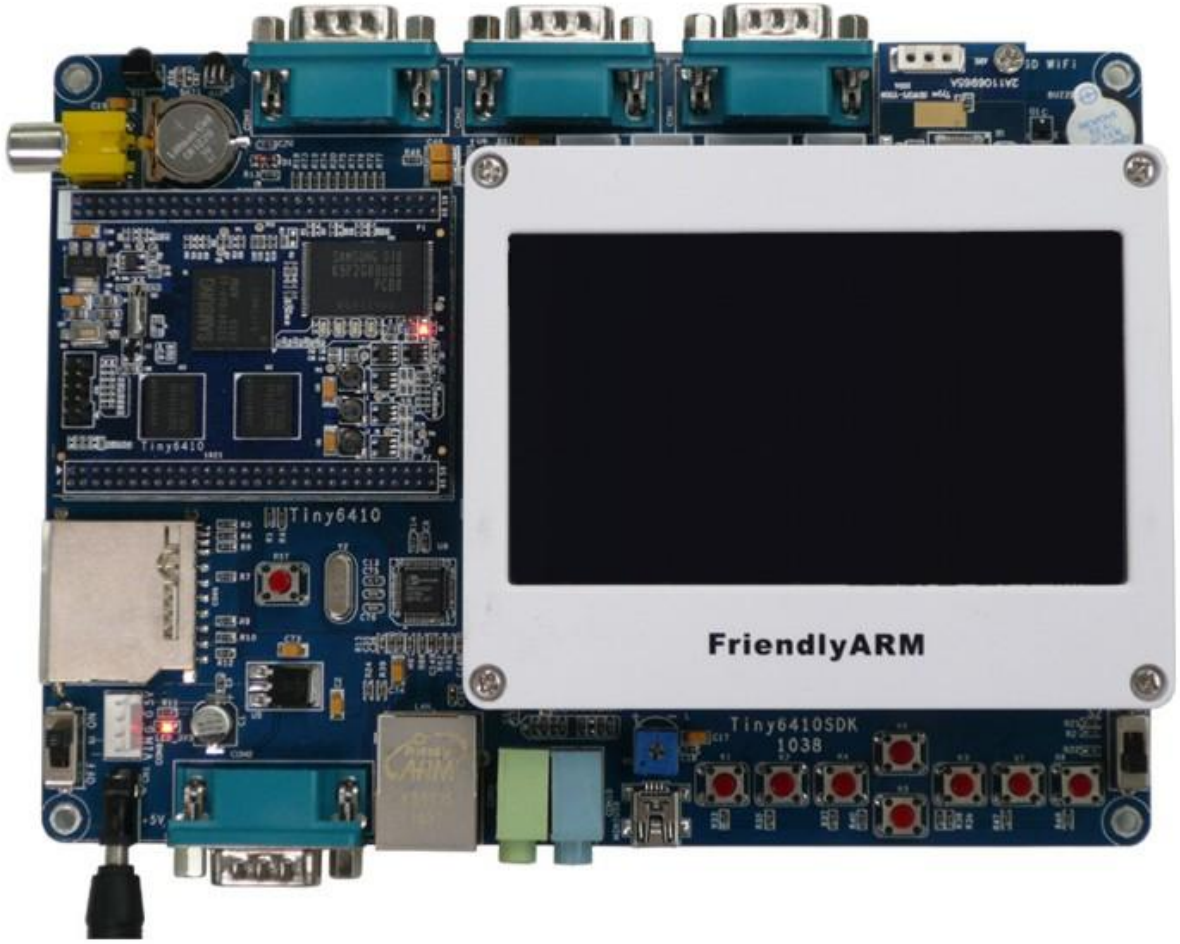
Chapter 1 Overview

1.1 OverView

The S3C6410-TFA vBoard Computer is a high-performance controller board introduced. It is designed based on the S3C6410 microcontroller, 256MByte DDR SDRAM,
1GByte Nand Flash, RTC, Audio and net on board. It has integrated RS232, USB, Ethernet, Audio In/Out, Keyboard, LCD, CVBS、TV out, camera in, SD card and more other functions on board. So many hardware resources provided by the expansion board, it becomes a solid reference board for customer design.

We also offers a complete software development package to customers. The board supports linux 2.6.36, Android2.1 and WindowsCE 6.0 operating system and is provided with complete basic drivers which enable a quick channel to evaluate the Samsung S3C6410 processor and customize application software. It would be an ideal development platform for multimedia and communication applications



1.2 Hardware Features

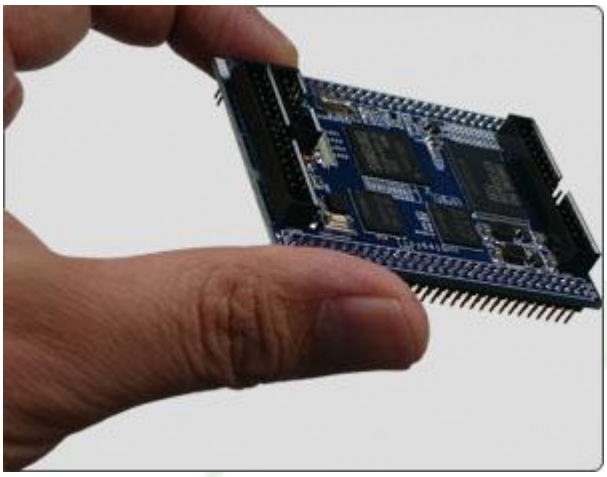
The S3C6410X is a 16/32-bit RISC microprocessor, which is designed to provide a cost-effective, low-power capabilities, high performance Application Processor

solution for mobile phones and general applications. To provide optimized H/W performance for the 2.5G & 3G communication services, the S3C6410X adopts 64/32-bit internal bus architecture. It also includes many powerful hardware accelerators for tasks such as motion video processing, audio processing, 2D graphics, display manipulation and scaling. An integrated Multi Format Codec (MFC) supports encoding and decoding of MPEG4/H.263/H.264 and decoding of VC1.

The S3C6410-TFA Single Board Computer is based on S3C6410 processor. This board is characterized as follows chapter.

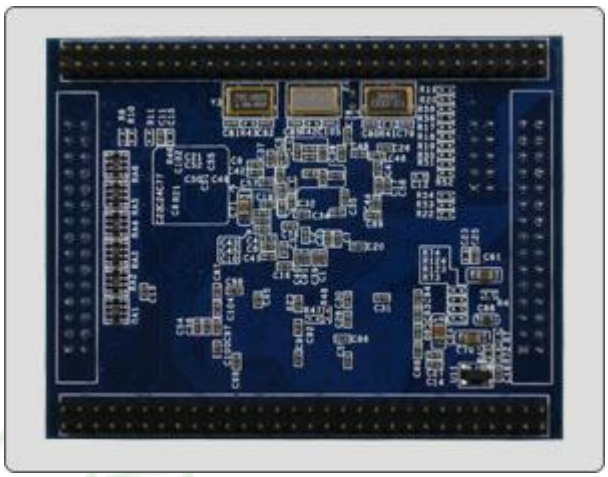
Chapter 2 S3C6410-TFA CPU board

2.1 Feature of the S3C6410-TFA CPU board



Item	Description
CPU	• Samsung S3C6410A, run at 533Mhz ARM1176JZF-S, up to 667Mhz
RAM	• 256 DDR RAM
Flash	• 256 MB DDR RAM, 32 bit Bus
Interface	• 4 x User Leds • 10 pin 2.0mm space Jtag connector • Reset button on board
Connector	• 2 x 60 pin 2.0mm space DIP connector • 2 x 30 pin 2.0mm space GPIO connector
Power Supply	• Supply Voltage from 2.0V to 6V
Size	• 64 x 50 x 12mm (L x W x H)
OS Support	• Windows CE 6 • Linux 2.6.38 • Android 2.3 • Ubuntu 9.10

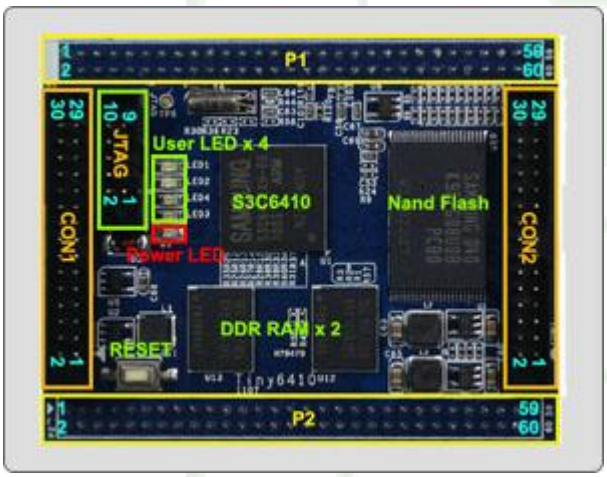
S3C6410-TFA Front view



S3C6410-TFA Bottom view

2.2 Pin definition of the S3C6410-TFA CPU board

S3C6410-TFA CPU board use the 2.0mm pitch double pin, leads to a total of 4 groups: P1, P2, CON1, CON2.
P1 and P2 are each 60 Pin; CON1 and CON2 are each 30Pin, leads to a total of 180 Pin.The follow shown is the layout description:



Pin	Details
P1	Contain LCD, AD, SDIO2, EINT, USB, TVOUT0
P2	Serial port, SPI1, I2C, SD Card, AC97(I2S), System bus
CON1	GPIO , AD , SPI0 , TAVOUT1
CON2	CMOS , GPIO
JTAG	JTAG interface
Others	4 User LED, power LED, Reset key.

P1	Pin define	Remarks	P1	Pin define	Remarks
P1.1	VDD_5V	DC 5V input	P1.2	GND	GND
P1.3	VD23	LCD_R5/GPJ7	P1.4	VD22	LCD_R4/GPJ6
P1.5	VD21	LCD_R3/GPJ5	P1.6	VD20	LCD_R2/GPJ4
P1.7	VD19	LCD_R1/GPJ3	P1.8	VD18	LCD_R0/GPJ2
P1.9	VD15	LCD_G5/GPI15	P1.10	VD14	LCD_G4/GPI14
P1.11	VD13	LCD_G3/GPI13	P1.12	VD12	LCD_G2/GPI12
P1.13	VD11	LCD_G1/GPI11	P1.14	VD10	LCD_G0/GPI10

P1.15	VD7	LCD_B5/GPI7	P1.16	VD6	LCD_B4/GPI6
P1.17	VD5	LCD_B3/GPI5	P1.18	VD4	LCD_B2/GPI4
P1.19	VD3	LCD_B1/GPI3	P1.20	VD2	LCD_B0/GPI2
P1.21	VDEN	VDEN/GPJ10	P1.22	PWM1	PWM1/GPF15
P1.23	VSYNC	LCD Column signal/GPJ9	P1.24	HSYNC	LCD row singal/GPJ8
P1.25	VCLK	LCD clock /GPJ11	P1.26	GPE0	GPE0
P1.27	VBUS	VBUS	P1.28	OTGDRV_VBUS	OTGDRV_VBUS
P1.29	OTGID	OTGID	P1.30	XEINT8	EINT8/GPN8
P1.31	OTGDM	USB Slave D-	P1.32	USBDN	USB Host D-
P1.33	OTGDP	USB Slave D+	P1.34	USBDP	USB Host D+
P1.35	TSXP	TSXP/AIN7	P1.36	TSXM	TSXM/AIN6
P1.37	TSYP	TSYP/AIN5	P1.38	TSYM	TSYM/AIN4
P1.39	AIN0	AIN0	P1.40	AIN1	AIN1
P1.41	WiFi_IO	WiFi_IO/GPP10	P1.42	WiFi_PD	WiFi_PD/GPP11
P1.43	SD1_CLK	SD1_CLK/GPH0	P1.44	SD1_CMD	SD1_CMD/GPH1
P1.45	SD1_nCD	SD1_nCD/GPN10	P1.46	SD1_nWP	SD1_nWP/GPL14
P1.47	SD_DAT0	SD1_DAT0/GPH2	P1.48	SD1_DAT1	SD1_DAT1/GPH3
P1.49	SD1_DAT2	SD1_DAT2/GPH4	P1.50	SD1_DAT3	SD1_DAT3/GPH5
P1.51	DACOUT0	TV -OUT	P1.52	PWM0	PWM0/GPF14
P1.53	XEINT0	XEINT0/GPN0	P1.54	XEINT1	XEINT1/GPN1
P1.55	XEINT2	XEINT2/GPN2	P1.56	XEINT3	XEINT3/GPN3
P1.57	XEINT4	XEINT4/GPN4	P1.58	XEINT5	XEINT5/GPN5
P1.59	XEINT19	XEINT19/GPL11	P1.60	XEINT20	XEINT20/GPL12

P2	Pin define	Remarks	P2	Pin define	Remarks
P2.1	OM3	SD/NAND boot set	P2.2	OM4	SD/NAND boot set
P2.3	M_nRESET	Reset signal	P2.4	VDD_RTC	RTC battle
P2.5	RTSn1	RTSn1/GPA7	P2.6	CTSn1	CTSn1/GPA6
P2.7	TXD0	TXD0/GPA1	P2.8	RXD0	RXD0/GPA0
P2.9	TXD1	TXD1/GPA5	P2.10	RXD1	RXD1/GPA4
P2.11	TXD2	TXD2/GPB1	P2.12	RXD2	RXD2/GPB0
P2.13	TXD3	TXD3/GPB3	P2.14	RXD3	RXD3/GPB2
P2.15	SPIMOSI	SPIMOSI/GPC6	P2.16	SPIMISO	SPIMISO/GPC4
P2.17	SPICLK	SPICLK/GPC5	P2.18	SPICS	SPICS/GPC7
P2.19	I2CSCL	I2CSCL/GPB5	P2.20	I2CSDA	I2CSDA/GPB6

P2.21	SD0_CLK	SD0_CLK/GPG0	P2.22	SD0_CMD	SD0_CMD/GPG1
P2.23	SD0_nCD	SD0_nCD/GPG6	P2.24	SD0_nWP	SD0_nWP/GPL13
P2.25	SD0_DAT0	SD0_DAT0/GPG2	P2.26	SD0_DAT1	SD0_DAT1/GPG3
P2.27	SD0_DAT2	SD0_DAT2/GPG4	P2.28	SD0_DAT3	SD0_DAT3/GPG5
P2.29	AC97_BITCLK	AC97_BITCLK/GPD0	P2.30	AC97_RSTn	AC97_RSTn/GPD1
P2.31	AC97_SYNC	AC97_SYNC/GPD2	P2.32	AC97_SDO	AC97_SDO/GPD4
P2.33	AC97_SDI	AC97_SDI/GPD3	P2.34	XEINT12	XEINT12/GPN12
P2.35	ADDR0	ADDR0	P2.36	ADDR1	ADDR1
P2.37	ADDR2	ADDR2	P2.38	ADDR3	ADDR3
P2.39	nCS1	nCS1	P2.40	XEINT7	XEINT7/GPN7
P2.41	nWAIT	nWAIT	P2.42	nESET	Reset Signal(Output)
P2.43	LnWE	LnWE	P2.44	LnOE	LnOE
P2.45	DATA0	DATA0	P2.46	DATA1	DATA1
P2.47	DATA2	DATA2	P2.48	DATA3	DATA3
P2.49	DATA4	DATA4	P2.50	DATA5	DATA5
P2.51	DATA6	DATA6	P2.52	DATA7	DATA7
P2.53	DATA8	DATA8	P2.54	DATA9	DATA9
P2.55	DATA10	DATA10	P2.56	DATA11	DATA11
P2.57	DATA12	DATA12	P2.58	DATA13	DATA13
P2.59	DATA14	DATA14	P2.60	DATA15	DATA15

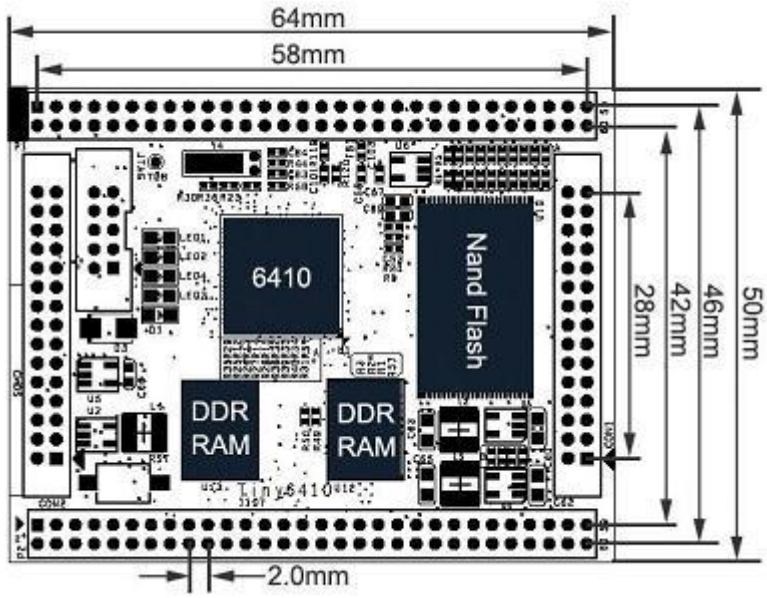
CON1	Pin define	Remarks	CON1	Pin define	Remarks
CON1.1	VDD_IO(3.3V)	OUT	CON1.2	GND	
CON1.3	GPE1		CON1.4	GPE2	
CON1.5	GPE3		CON1.6	GPE4	
CON1.7	GPM0		CON1.8	GPM1	
CON1.9	GPM2		CON1.10	GPM3	
CON1.11	GPM4		CON1.12	GPM5	
CON1.13	GPQ1		CON1.14	GPQ2	
CON1.15	GPQ3		CON1.16	GPQ4	
CON1.17	GPQ5		CON1.18	GPQ6	
CON1.19	SPICLK0		CON1.20	SPIMISO0	
CON1.21	SPICS0		CON1.22	SPIMOSI0	
CON1.23	EINT6		CON1.24	EINT9	
CON1.25	EINT11		CON1.26	EINT16	

CON1.27	EINT17	CON1.28	AIN2
CON1.29	AIN3	CON1.30	DACOUT1

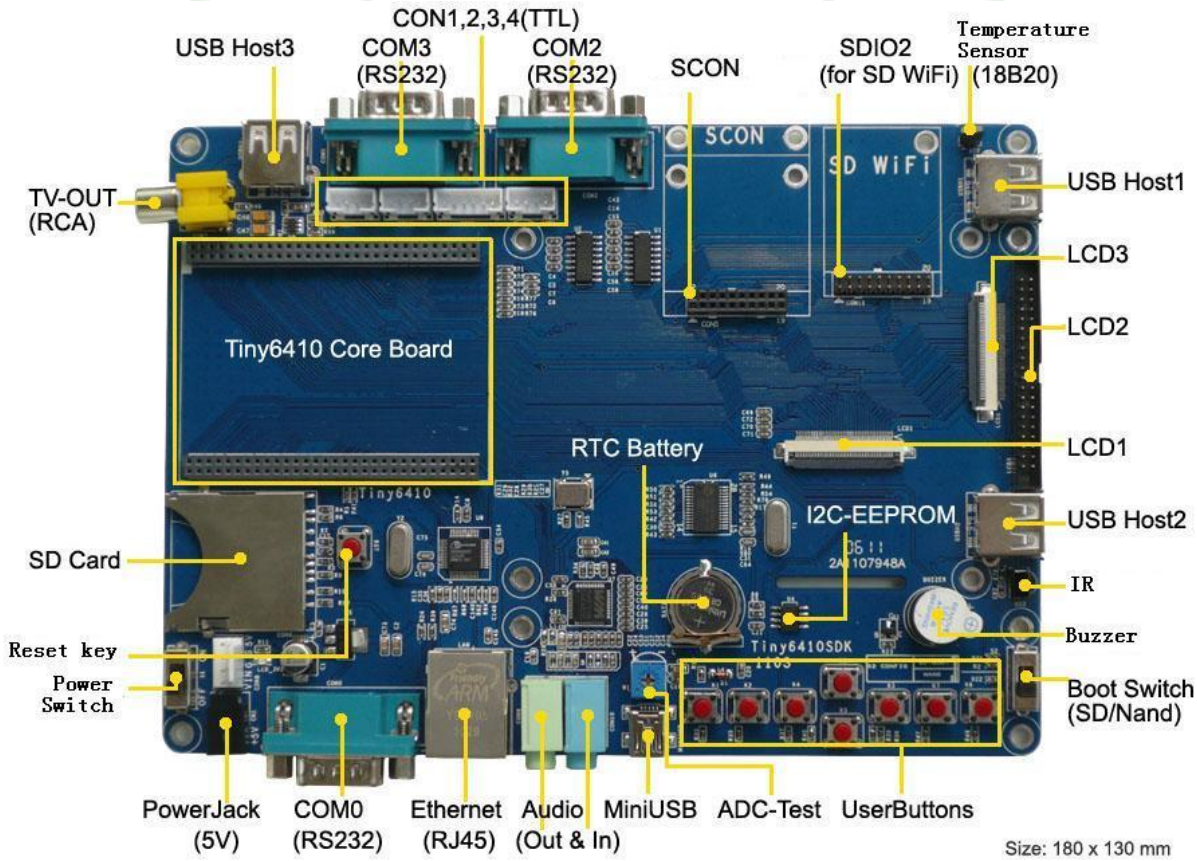
CON2	Pin define	Remarks	CON2	Pin define	Remarks
CON2.1	CAMSDA	link I2CSDA	CON2.2	CAMSCL	
CON2.3	GPK2		CON2.4	CAMRSTn	
CON2.5	CAMCLK		CON2.6	CAMHREF	
CON2.7	CAMVSYNC		CON2.8	CAMPCLK	
CON2.9	CAMDATA7		CON2.10	CAMDATA6	
CON2.11	CAMDATA5		CON2.12	CAMDATA4	
CON2.13	CAMDATA3		CON2.14	CAMDATA2	
CON2.15	CAMDATA1		CON2.16	CAMDATA0	
CON2.17	VDD_IO(3.3V)	OUT	CON2.18	VDDCAM	2.4-2.8V for CMOS
CON2.19	1.8V	for CMOS	CON2.20	GND	
CON2.21	GPK8		CON2.22	GPK12	
CON2.23	GPK13		CON2.24	EINT18	
CON2.25	VD0	For LCD	CON2.26	VD1	For LCD
CON2.27	VD8	For LCD	CON2.28	VD9	For LCD
CON2.29	VD16	For LCD	CON2.30	VD17	For LCD

JTAG	Pin define	Remarks	JTAG	Pin define	Remarks
1	VDD_IO	Power input 3.3V	2	VDD_IO	Power input 3.3V
3	TRSTn	TRSTn	4	nRESET	nRESET
5	TDI	TDI	6	TDO	TDO
7	TMS	TMS	8	GND	GND
9	TCK	TCK	10	GND	GND

2.3 Dimensions of the S3C6410-TFA CPU board



Chapter 3 Mother board



Feature of the S3C6410-TFA SDK board

Item	Description

CPU	Samsung S3C6410A(ARM1176JZF-S)
Frequency	Operating frequency 533Mhz, up to 667Mhz
RAM	256 MB DDR RAM
Nand Flash	256MB Nand Flash
Multimedia	Support for Mpeg4, H.264, H.263, VC1 hardware decoding, up to 30fps @ SD
3D	3D hardware acceleration support
2D	Promise to support graphics scaling, rotation, flip
Debug Port	COM0 + JTAG + USB Slave
Indicator	4 x User LED (in the core board), 1 x Power LED
Test button	8 x User Buttons, interrupt-style buttons
USB Slave	1 x mini USB (OTG floor is not designed to function)
USB Host	Through the USB HUB chip, to achieve 4 USB Host
Network Interface	10/100M MB Ethernet, RJ-45 interfaces
Audio I/O	Standard two-channel audio input 3.5mm input and output ports
SD Card	Normal SD card connector
Serial	3 x RS232 DB9 serial port, 4 x TTL-level serial port Block
TV-OUT	1 x RCA output
SDIO2 Interface	Mainly used to access SD WiFi module (also includes SPI, I2C interface)
LCD Interface	3 LCD Interface Block leads (0.5mm pitch SMT, including seats, seat pin and 2.0mm pitch)
Buzzer	1 x PWM control the buzzer output
IR	1 channel infrared receiver
Temperature Sensor	1 Road DS18B02 Temperature Sensor
ADC conversion	An adjustable resistor, connected CPU's AD0 channel
RTC clock	On-board battery backup RTC clock
Power Supply	5V
PCB size	180 x 130 mm

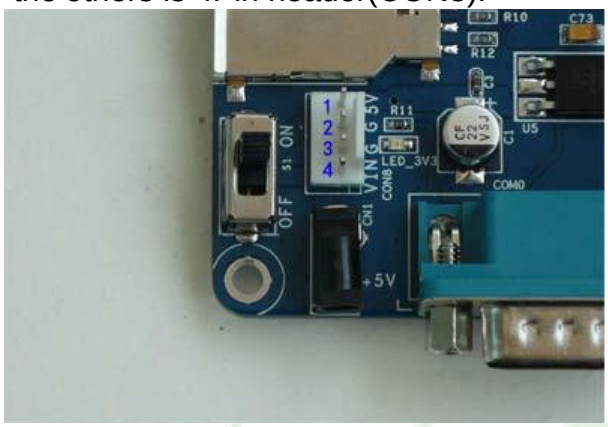
Address start	Address end	Size(MB)	Description
0x0000_0000	0x07FF_FFFF	128MB	Boot image
0x0800_0000	0x0BFF_FFFF	64MB	In-ROM
0x0C00_0000	0x0FFF_FFFF	128MB	Stepping Stone(8KB)
0x1000_0000	0x17FF_FFFF	128MB	
0x1800_0000	0x1FFF_FFFF	128MB	DM9000AEP
0x2000_0000	0x27FF_FFFF	128MB	
0x2800_0000	0x2FFF_FFFF	128MB	

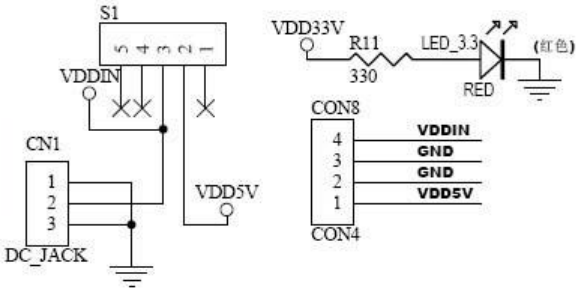
0x3000_0000	0x37FF_FFFF	128MB	
0x3800_0000	0x3FFF_FFFF	128MB	
0x4000_0000	0x47FF_FFFF	128MB	
0x4800_0000	0x4FFF_FFFF	128MB	
0x5000_0000	0x5FFF_FFFF	256MB	128MB DDR RAM
0x6000_0000	0x6FFF_FFFF	256MB	128M DDR RAM

Chapter 4 Interface

4.1 Power In

The board use 5V power supply, it have two method to power the board. One is the D-jack (CN1)power in,
the others is 4Pin header(CON8).

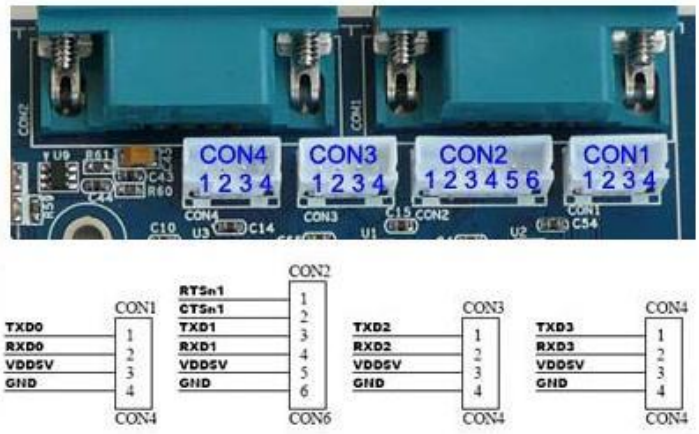




CON8	Pins defines
1	VDD5V
2	GND
3	GND
4	VDDIN

4.2 Serial port

S3C6410 have four serial port, it is UART0,1,2,3, UART1 is 5-wired serial, the others is 3-wired serial.
In S3C6410-TFASDK board, COM0,1,2 was linked to DB9 interface in RS232, **you can link it to PC.**
And the all serial was linked from the board to CON1, CON2, CON3, CON4 in TTL.



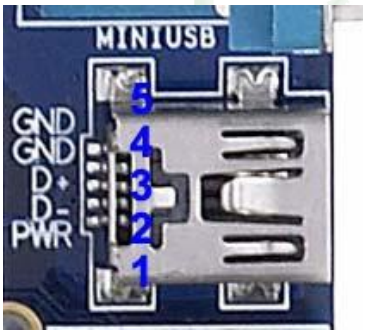
CON0,1,2,3 pin signal is as follow:

CON0	Pins signal	CON1	Pin signal	CON2	Pin signal	CON3	Pin signal
1	NC	1	NC	1	NC	1	NC
2	RSRXD0	2	RSRXD1	2	RSRXD2	2	RSRXD3
3	RSTXD0	3	RSRXD2	3	RSRXD2	3	RSRXD3
4	NC	4	NC	4	NC	4	NC
5	GND	5	NC	5	GND	5	NC
6	NC	6	NC	6	NC	6	NC
7	NC	7	RSCTS1	7	NC	7	NC
8	NC	8	RSRTS1	8	NC	8	NC
9	NC	9	NC	9	NC	9	NC

4.3 USB interface

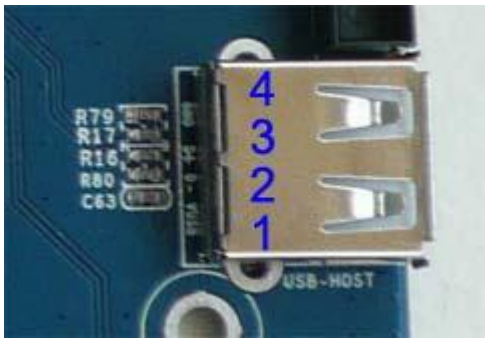
In S3C6410-TFA board, it have 5 usb interface, there are 4 usb host, and the other is usb slave interface.

miniUSB interface(USB device)



miniUSB	Pin signal
5	GND
4	OTGID
3	D+
2	D-
1	Vbus

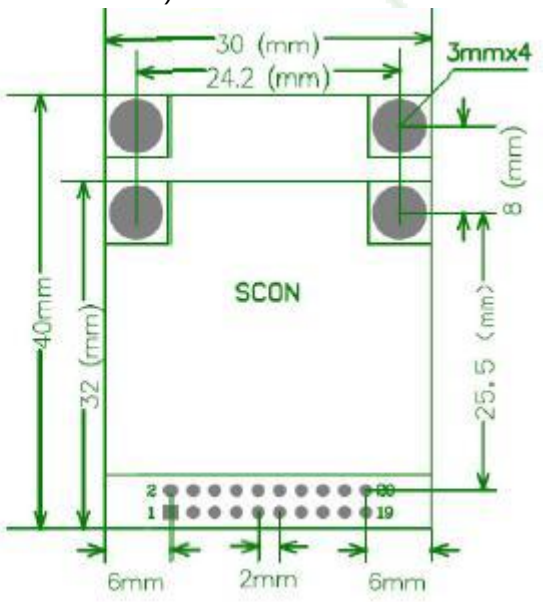
USB Host interface



Pin signal	Pin signal
1	5V
2	D-
3	D+
4	GND

4.4 SCON interface

In order to use more serial port peripherals, we deliberately designed the SCON interface and call it "serial port Center, "which includes two serial ports, an I2C interface, an SPI interface, a USB Host port, but also Have a GPIO port, etc., and includes 5V and 3.3V power supply output pin, as shown in Figure (right side interface mechanical dimensions SCON):



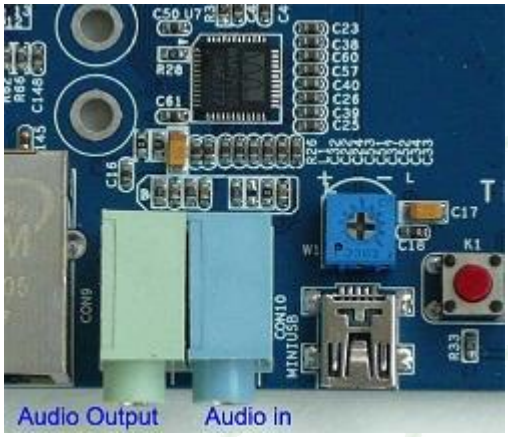
SCON	Pin Define	Remark	SCON	Pin Define	Remark
1	GND		2	5V Power out	
3	USB_D-		4	USB_D+	
5	I2CSCL		6	I2CSDA	
7	TXD1	TTL level	8	RXD1	TTL level
9	CTSn1	TTL level	10	RTSn1	TTL level
11	TXD2	TTL level	12	RXD2	TTL level
13	SPIMOSI	SPI1	14	SPIMISO	SPI1
15	SPICS	SPI1	16	SPICLK	SPI1
17	nRESET	Reset	18	EINT8	EINT
19	GND		20	3.3V Power out	

4.5 Network interface

the board carries a 100M network card interface, use the DM9000 chips.

4.6 Audio intreface

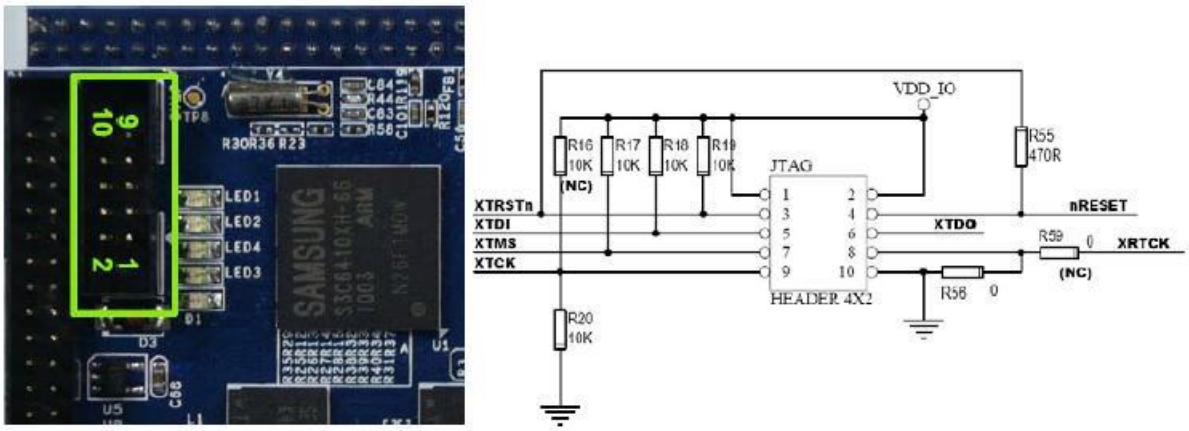
The S3C6410 can support I2C/PCM/AC97 audio interface, S3C6410-TFA use the AC97 interfacem and use the WM9714 as the codec function.



4.7 TV-out interface

The board provide 1 TV-out interface, it is from DACOUT0.
When you use DACOUT0, you should set the TV mode for CVBS mode.

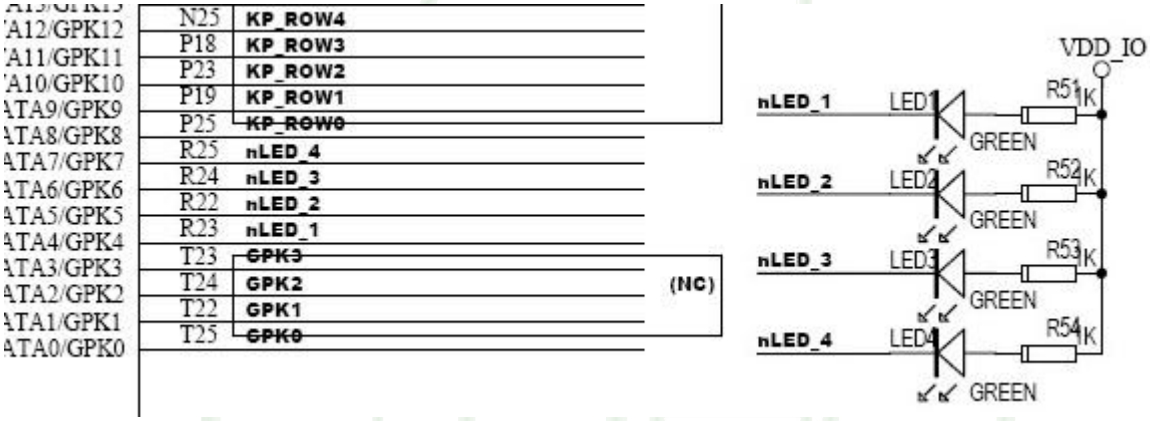
4.8 JTAG



4.9 LED

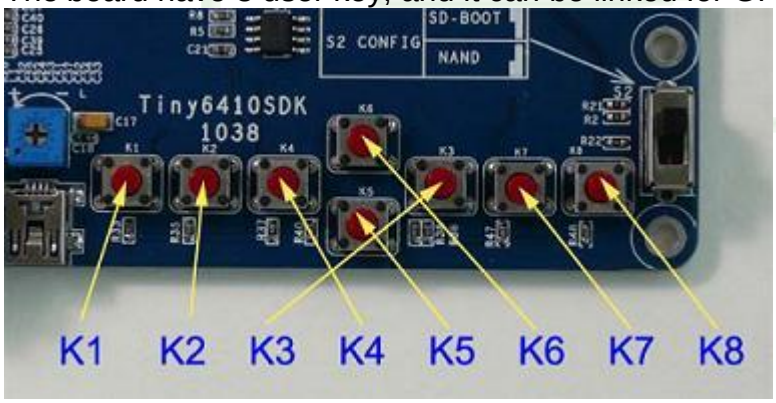
The board have 4 LED, you can control it, When output GPIO for 0, the LED will be light.

LED	LED4	LED3	LED2	LED1
GPIO	GPK7	GPK6	GPK5	GPK4



4.9 Key

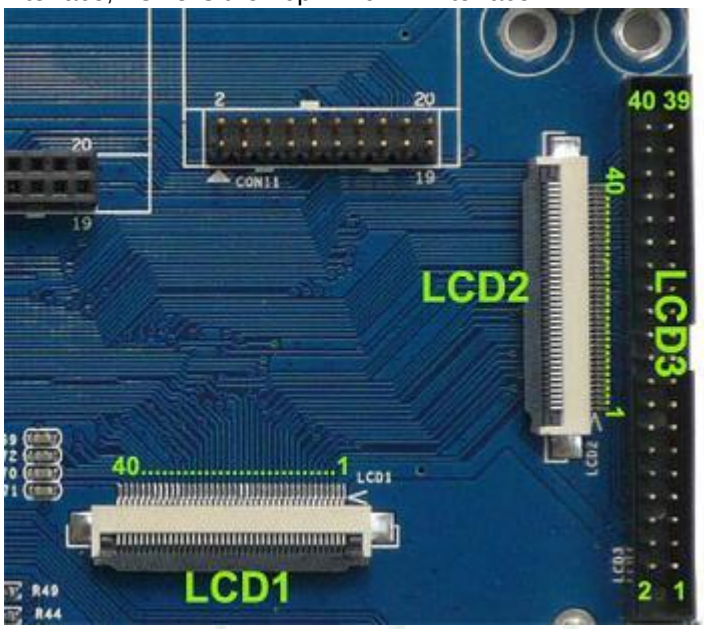
The board have 8 user key, and it can be linked for GPIO(CON12).



KEY	K1	K2	K3	K4	K5	K6	K7	K8
EINT	EINT0	EINT1	EINT2	EINT3	EINT4	EINT5	EINT19	EINT20
GPIO	GPN0	GPN1	GPN2	GPN3	GPN4	GPN5	GPL11	GPL12

4.11 LCD interface

The board have 3 LCD interface, it have the same signal, LCD1 and LCD2 is the 40pin 0.5mm pitch interface, LCD3 is the 40pin 2.0mm interface.



LCD2&LCD3 Pins signal detaisl

LCD1&LCD2&LCD3 signal		LCD1&LCD2&LCD3 signal	
1	5V	2	5V
3	NC	4	NC
5	VD2	6	VD3
7	VD4	8	VD5
9	VD6	10	VD7
11	GND	12	NC
13	NC	14	VD10
15	VD11	16	VD12
17	VD13	18	VD14
19	VD15	20	GND
21	NC	22	NC
23	VD18	24	VD19
25	VD20	26	VD21
27	VD22	28	VD23
29	GND	30	GPE0/LCD_PWR
31	PWM1/GPF15	32	nRESET
33	VDEN/VM	34	VSYNC
35	HSYNC	36	VCLK

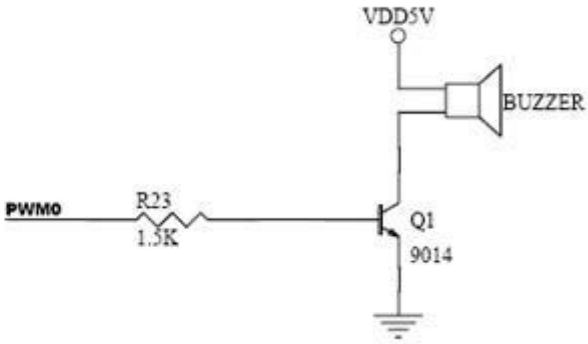
37	TSXM	38	TSXP
39	TSYM	40	TSYP
		41	GND

4.12 ADC input

The board have 2 Chanel A/D, AIN0 was linked to W1, it can be configure 10/12 bit.

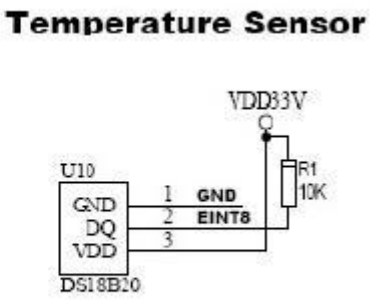
4.13 PWM(buzzer)

The Buzzer in the board was controlled by PWM, it is PWM0(GPF14)



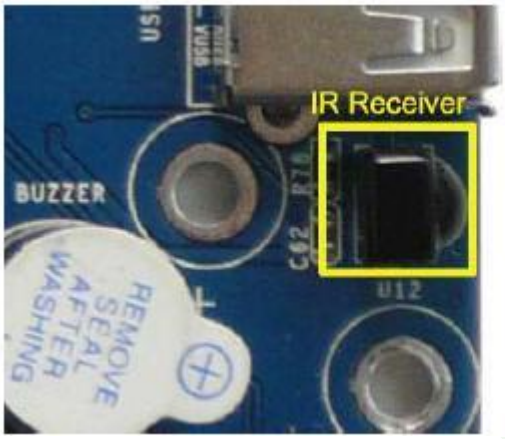
4.14 temperature sensor

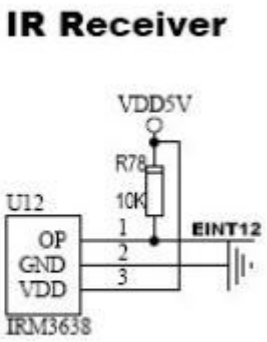
The board have a temperature sensor, it use DS18B20 chips.



4.15 IR

In the board, it have IR, the name is IRM3638, It link to the pin EINT12 as received pins.





4.16 I2C-EEPROM

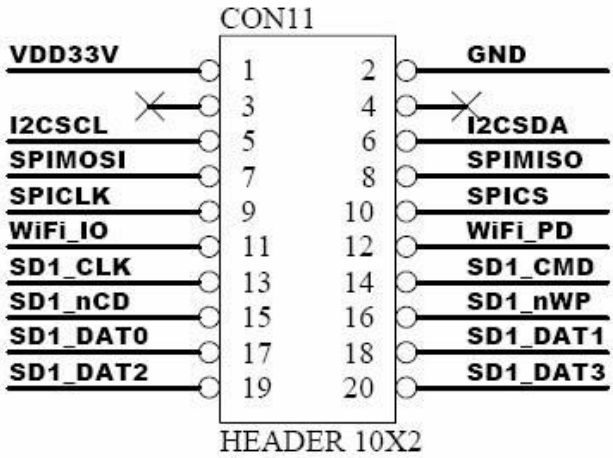
The I2C was linked to EEPROM, AT24C08, it was 256byte. only for test the I2C.

4.17 SD card slot

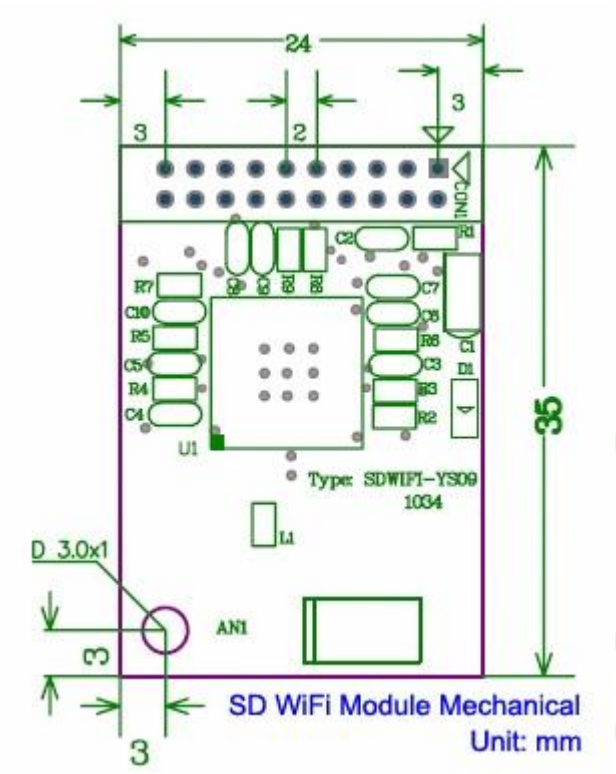
It have a SD card slot, can support 32GByte.

4.18 SDIO-II/SD-WiFi interface

The SDIO was linked to CON11, it also contain 1 SPI, 1 I2C, 4 GPIO.



SD wifi size:


24
3
2
3
CON1
C2
R1
R7
C10
R5
C5
R4
C4
U1
R6
R8
C7
C6
C1
C3
D1
R3
R2
35
Type: SDWIFI-YS09
1034
L1
D 3.0x1
AN1
3
3
SD WiFi Module Mechanical
Unit: mm

Chapter V Hardware feature

5.1 Boot mode set

You can choose the boot mode for S2 switch,
S2: in SDBOOT, the board will boot from sd card,
S2: in NAND, the board will boot from nand.